AMENDMENTS TO THE CLAIMS:

1. (Currently Amended) A mirror comprising:

a fiber reinforced substrate including first fibers arranged in a coarse structural pattern;

an optical quality surface on the substrate;

a reflective optical coating on the optical quality surface; and

a fiber reinforced layer between the substrate and the optical quality surface, said fiber reinforced layer including submicron diameter second fibers arranged in a fine structure that diffuses print through of ~~any structure~~ the coarse structural pattern from the substrate to the optical quality surface.

2. (Currently Amended) The mirror of claim 1, wherein the ~~fiber reinforced substrate and said fiber reinforced layer respectively comprise~~ first and second fibers have substantially the same coefficient of thermal expansion (CTE) ~~in a matrix~~ material, ~~said substrate being characterized by a first scale factor that is a measure of the structure of the first fibers, said fiber reinforced layer being characterized by a second scale factor that is a measure of the structure of the second fibers and is less than said first scale factor~~.

3. (Currently Amended) The mirror of claim ~~2~~ 1, wherein the first fibers are bundled into tows and woven into a cloth ~~in the matrix,~~ having a first scale factor determined by the tow-to-tow spacing, said fine structure of the second fibers having a second ~~first~~ scale factor ~~being~~ at least one order of magnitude ~~greater~~ smaller than said ~~second~~ first scale factor.

4. (Currently Amended) The mirror of claim ~~3~~ 1, wherein the optical quality surface has an initial surface quality of no worse than 10 nanometers RMS, said fiber reinforcement layer diffusing the print through of the coarse structural pattern to maintain surface quality to better than 15 nanometers RMS ~~the diameter of said second fibers is less than the diameter of said first fibers~~.

5. (Currently Amended) The mirror of claim 1, wherein the fiber reinforced ~~layer comprises~~ layer's submicron diameter second fibers comprise ~~randomly arranged~~ fibrils having a diameter less than 1um and a length at least one hundred times the diameter randomly arranged within the layer.

6. (Original) The mirror of claim 5, wherein the fibrils have a diameter less than 0.3micron.

7. (Original) The mirror of claim 5, wherein the fibrils comprise carbon nanotubes having a diameter less than 0.01 micron in diameter.

8. (Currently Amended) The mirror of claim 1, wherein the fiber reinforced layer comprises an untowed weave of continuous second fibers.

9. (Currently Amended) The mirror of claim ~~8~~ 1, wherein the fiber reinforced layer comprises a towed weave of continuous second fibers in which each tow includes less than 200 fibers.

10. (Currently Amended) The mirror of claim 1, wherein the fiber reinforced layer comprises a mat of continuous second fibers.

11. (Original) The mirror of claim 1, wherein the optical quality surface is formed in the fiber reinforcement layer.

12. (Original) The mirror of claim 1, wherein the optical quality surface is formed in another layer formed on the fiber reinforcement layer

13. (Currently Amended) A mirror comprising:

a common matrix;

a first layer of fibers in the matrix, said fibers ~~having~~ arranged in a coarse structural pattern characterized by a first scale factor;

a second layer of submicron diameter fibers in the matrix over said first layer, said submicron diameter fibers arranged in a fine structure ~~having a structural pattern~~ characterized by a second scale factor at least an order of magnitude less than the first scale factor; and

a reflective optical coating over said second layer,

said fine structure of the submicron diameter fibers in the second layer diffusing print through of the coarse structural pattern from the first layer to the reflective optical coating.

14. (Currently Amended) The mirror of claim 13, wherein the fibers in the first layer are bundled into tows and woven into a cloth, said first scale factor being a measure of the spacing of the tows in the cloth ~~and having a value at least one order of magnitude greater than said second scale factor~~.

15. (Currently Amended) The mirror of claim 13, wherein the fibers in the second layer are arranged in randomly arranged fibrils, an untowed weave or a mat~~, said second scale factor being at least one order of magnitude smaller than said first scale factor~~.

16. (Currently Amended) The mirror of claim 13, wherein the fibers in the first layer ~~have a diameter of at least 1micron~~ and the fibers in the second layer ~~have a diameter less than 1micron~~ are the same material.

17. (Currently Amended) A mirror comprising:

a substrate including a matrix reinforced with a plurality of fibers bundled into tows and woven into a cloth, said tows having a diameter of at least 0.5 mm;

a layer of fibrils randomly bound in the matrix on the surface of the substrate, said fibrils having a diameter of less than 1 micron; and

a reflective optical coating,

said randomly bound fibrils diffusing print through of the fiber weave in the substrate to the reflective optical coating.

18. (Original) The mirror of claim 17, wherein the matrix is a carbon, ceramic, metal or polymer material and the fibers in the cloth and the fibrils are the same material selected from graphite, silicon-carbide, Boron-carbide, Boron-nitride, or boron.

19. (Original) The mirror of claim 18, wherein said fibrils have a diameter less than 0.3 micron.

20. (Original) A mirror comprising:

a carbon-carbon substrate;

a layer of submicron diameter graphite fibrils randomly bound in the substrate's carbon matrix; and

a reflective optical coating.

21. (Original) The mirror of claim 20, wherein the carbon-carbon substrate comprises a plurality of graphite fibers bundled into tows and woven into a cloth in a carbon matrix, said cloth having a center-to-center spacing of at least 1 mm.

22. (Original) The mirror of claim 21, wherein the graphite fibrils have a diameter of less than 0.3 micron.

23. (Withdrawn) A method of constructing a mirror, comprising:

laying a fiber cloth in a mold having a predetermined optical surface shape;

laying submicron diameter fibers on the cloth;

adding a matrix pre-cursor;

pre-heating the mold to carbonize the pre-cursor;

heating the mold to graphitize the matrix;

forming an optical quality surface on the reinforced matrix; and

forming a reflective optical coating on the optical quality surface.

24. (Withdrawn) The method of claim 20, wherein a matrix pre-cursor is added to the fiber cloth and pre-heated to carbonize the pre-cursor before the submicron diameter fibers are added.

25. (Withdrawn) The method of claim 23, wherein the optical quality surface is formed by,

machining the surface of the submicron diameter fibers;

depositing a layer of metal, semi-metal or ceramic material; and

machining the layer to form the optical quality surface.

26. (Withdrawn) The method of claim 23, wherein the fiber cloth comprises a plurality of bundled and woven fibers and the submicron diameter fibers comprise fibrils, an untowed weave or a mat.

27. (Withdrawn) A method of constructing a mirror, comprising:

providing a graphitized fiber reinforced matrix in a mold having a predetermined optical surface shape;

laying submicron diameter fibers on the matrix;

providing a matrix pre-cursor;

pre-heating the substrate to carbonize the pre-cursor;

heating the substrate to graphitize the matrix;

forming an optical surface; and

forming a reflective optical coating on the optical surface.

28. (Withdrawn) The method of claim 27, wherein the matrix is reinforced with a plurality of fibers bundled into tows and woven into a cloth and the submicron diameter fibers comprise fibrils, an untowed weave or a mat.

29. (New) A mirror comprising:

a substrate including a matrix reinforced with a plurality of first fibers bundled into tows and woven

into a cloth, said tows having a diameter of at least 0.5 mm;

an optical quality surface on the substrate;

a reflective optical coating on the optical quality surface; and

a layer of submicron diameter second fibers, formed of the same material as said first fibers, arranged in a fine structure and bound in the matrix on the surface of the substrate below the optical quality surface, said fine structure of submicron diameter fibers diffusing and randomizing stresses created by the weave pattern of the cloth to inhibit transference of the pattern to the optical quality surface.